

87. An optical recording/reproducing apparatus for recording, reproducing or erasing an information signal onto/from any one of N types (where $N \geq 2$) of optical discs having first layers of different thicknesses, each type of said optical discs having at least said first layer being transparent and a second layer for storing information, said apparatus comprising:

(a) an optical head including (i) a light emitting means for emitting a light flux, and (ii) a converging means for converging said light flux onto said second layer of any one of said N types of optical discs loaded in said apparatus, and performing aberration correction at said light flux in correspondence with the one of the optical discs loaded in said apparatus; and

(b) an optical head moving means arranged in said apparatus for moving said optical head relative to the optical disc loaded in said apparatus to traverse a recording track thereof;

wherein said converging means comprises different numerical apertures and converges said light flux as a smaller spot diameter D by employing a larger one of said effective numerical apertures, with respect to one of said optical discs having a thinner one of said first layers, and

wherein a thickness of said first layers of each of said N types of optical discs is about 1.2mm or less.

90. An apparatus as in claim 87, wherein each of said first layers comprises a transparent substrate.

91. An optical recording/reproducing system comprising:
(a) an optical recording/reproducing apparatus for recording, reproducing or erasing an information signal onto/from any one of N types (where $N \geq 2$) of optical discs having first layers of different thicknesses, each type of said optical discs having at least said first layer being transparent and a second layer for storing information, said apparatus comprising:

an optical head including (i) a light emitting means for emitting a light flux, and (ii) a converging means for converging said light flux onto said second layer of any one of said N types of optical discs loaded in said apparatus, and performing aberration correction at said light flux in correspondence with the one of the optical discs loaded in said apparatus; and

an optical head moving means arranged in said apparatus for moving said optical head relative to the optical disc loaded in said apparatus to traverse a recording track thereof;

wherein said converging means comprises different numerical apertures and converges said light flux as a smaller spot diameter D by employing a larger one of said effective numerical

apertures, with respect to one of said optical discs having a thinner one of said first layers, and

wherein a thickness of said first layers of each of said N types of optical discs is about 1.2mm or less;

(b) a signal processing means, responsive to one of (i) a reproduction signal, corresponding to said information signal, from said photo detecting means and (ii) receipt of recording data, corresponding to said information signal, for recording on said disk, for generating an output signal corresponding to said information signal for performing one of a reproducing operation and a recording operation; and

(c) a system controlling means coupled to said signal processing means for controlling generation of the output signal of said signal processing means.

92. A system as in claim 91, wherein each of said first layers comprises a transparent substrate.

93. An optical recording/reproducing apparatus for recording, reproducing or erasing an information signal onto/from any one of N types (where $N \geq 2$) of optical discs having first layers of different thicknesses, each type of said optical discs having at least said first layer being transparent and a second layer for storing information, said apparatus comprising:

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cont.

(a) an optical head including (i) a light emitting means for emitting a light flux, and (ii) a converging optical system including first converging means including a first numerical aperture and a second converging means including a second numerical aperture, said optical system for converging, by employing one of said first converging means and said second converging means, said light flux onto said second layer of any one of said N types of optical discs loaded in said apparatus and for performing aberration correction at said light flux in correspondence with the one of the optical discs loaded in said apparatus; and

(b) an optical head moving means arranged in said apparatus for moving said optical head relative to the optical disc loaded in said apparatus to traverse a recording track thereof;

wherein said converging optical system converges said light flux as a spot with a smaller diameter D by employing one of said first converging means and said second converging means having a larger one of said numerical apertures, with respect to one of said optical discs having a thinner one of said first layers, and

wherein a thickness of said first layers of each of said N types of optical discs is about 1.2mm or less.

94. An apparatus as in claim 93, wherein each of said first layers comprises a transparent substrate.

95. An optical recording/reproducing system comprising:
(a) an optical recording/reproducing apparatus for
recording, reproducing or erasing an information signal onto/from
any one of N types (where $N \geq 2$) of optical discs having first
layers of different thicknesses, each type of said optical discs
having at least said first layer being transparent and a second
layer for storing information, said apparatus comprising:

an optical head including (i) a light emitting means for
emitting a light flux, and (ii) a converging optical system
including first converging means including a first numerical
aperture and a second converging means including a second
numerical aperture, said optical system for converging, by
employing one of said first converging means and said second
converging means, said light flux onto said second layer of any
one of said N types of optical discs loaded in said apparatus and
for performing aberration correction at said light flux in
correspondence with the one of the optical discs loaded in said
apparatus; and

an optical head moving means arranged in said apparatus
for moving said optical head relative to the optical disc loaded
in said apparatus to traverse a recording track thereof;

wherein said converging optical system converges said light
flux as a spot with a smaller diameter D by employing one of said

first converging means and said second converging means having a larger one of said numerical apertures, with respect to one of said optical discs having a thinner one of said first layers, and wherein a thickness of said first layers of each of said N types of optical discs is about 1.2mm or less;

(b) a signal processing means, responsive to one of (i) a reproduction signal, corresponding to said information signal, from said photo detecting means and (ii) receipt of recording data, corresponding to said information signal, for recording on said disk, for generating an output signal corresponding to said information signal for performing one of a reproducing operation and a recording operation; and

(c) a system controlling means coupled to said signal processing means for controlling generation of the output signal of said signal processing means.

96. A system as in claim 95, wherein each of said first layers comprises a transparent substrate.

97. A system comprising:

(a) an optical recording/reproducing apparatus for recording, reproducing or erasing an information signal onto/from any one of N types (where $N \geq 2$) of optical discs having first layers of different thicknesses, each type of said optical discs

having at least said first layer being transparent and a second layer for storing information, said apparatus comprising:

an optical head including (i) a light emitting means for emitting a light flux, and (ii) a converging optical system including first converging means including a first numerical aperture and a second converging means including a second numerical aperture, said optical system for converging, by employing one of said first converging means and said second converging means, said light flux onto said second layer of any one of said N types of optical discs loaded in said apparatus and for performing aberration correction at said light flux in correspondence with the one of the optical discs loaded in said apparatus; and

an optical head moving means arranged in said apparatus for moving said optical head relative to the optical disc loaded in said apparatus to traverse a recording track thereof;

wherein said converging optical system converges said light flux as a spot with a smaller diameter D by employing one of said first converging means and said second converging means having a larger one of said numerical apertures, with respect to one of said optical discs having a thinner one of said first layers, and wherein a thickness of said first layers of each of said N types of optical discs is about 1.2mm or less;

(b) a signal processing apparatus including: